DOCUMENT RESUME

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ABSTRACT

Presented are 12 learning stations containing displays relating to land use. The booklet gives the necessary information to duplicate the Land Use learning activities. The first section contains working drawings, materials list, approximate cost, and a photograph as well as a description of the model. The text of a sign giving directions to the participants is also included. The second section contains all of the printed material including: Student Data Sheet, Land Use IQ Quiz, Land Use IQ Quiz Answer Sheet, and Teacher Data Sheet. (Author/WB)

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Management Guide for LAND USE SEMINAR

conservation plans and use guidelines

SE 032 886

INTRODUCTION

The Land Use program was designed and built at Quarry Hill Nature Center under a grant from the Office of Environmental Education (Grant No. G007700531). The project director and designer of this seminar, was Harry L. Buck of Quarry Hill Nature Center; project assistant was Bruce Chaney. The program was designed and built starting in September 1977 and finishing in February 1978. Since February 1978, the program has been distributed to schools in Region X under the sponsorhsip of The Regional Environmental Education Council (REEC). By the end of the school year it had been used beam used by nearly 6,500 participants. The program was developed with the cooperation of many agencies:

* U.S.D.A. - Soil Conservation Service
* U.S. Army Corps of Engineers
* Minnesota Department of Natural Resources
* Minnesota Pollution Control Agency
* Olmsted County Consolidated Planning

This booklet contains the necessary information to duplicate the Land Use learning activities. The first section contains working drawings, materials list, approximate cost, a photograph as well as a description of the model. The text of a sign giving directions to the participants is also included. The second section of the booklet contains all of the printed material. Included are:

Student Data Sheet
Land Use IQ Quiz
Land Use IQ Quiz Answer Sheet
Teacher Data Sheet

This program has been designed for the junior high level but has been used with good success from upper elementary up to adult participation. Elementary students require slightly over an hour to finish all activities while secondary students generally use an hour or less.

The cases which hold the displays are all built by dadoing the pine framing and inserting the ½" plywood into the dado, in the frame. All joints are glued and nailed. The cases are all painted with enamel, with each activity a different color. The directions sign carries out the same color as the activity.

The lettering for this project was done with LeRoy lettering device, using the template requiring a size 8 pen. Other lettering methods can be used, from a freehand magic marker to glue-on plastic letters. Check with an art supply store to get various possibilities.

The drawings in this booklet were prepared by Gerri Meyer and John Lodermeier of the Rochester Vocational Technical Institute. The typing and layout were done by Idelle Manthei, and photography by Larry Meyer of Quarry Hill Nature Center.

LAND USE ACTIVITY 1 - WHERE O'WHERE...

MATERIALS

8 sq.ft. 1/2" AD plywood
4 sq.ft. 1/4" AD plywood
8 sq.ft. 1/8" plexiglass
10 lineal ft. 1 x 4" pine
Model houses
Model trees
Model cars
Model railroad track
10 screws/finishing washers
4 sq.ft. grass paper

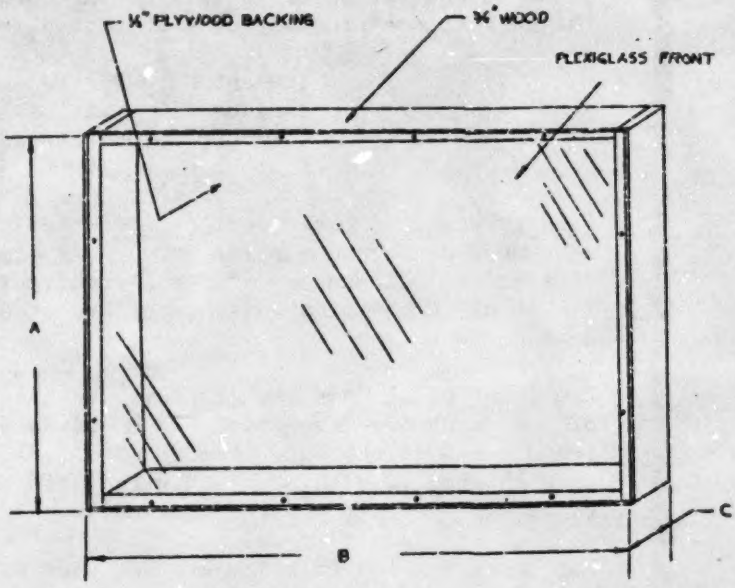
Approximate Cost $30.00

DIRECTIONS SIGN

WHERE O'WHERE...
Should the industry be built? This activity shows an area of land which has two open spaces, one to the north and one to the south. Along its west side is a river and a stream, along its east side a railroad and a gravel road. In which open space, north or south, would you build new industry? New housing? Why?

DESCRIPTION

This model shows a hypothetical area where development might occur. The two points of the triangle are available for development. The north triangle is bordered by a small stream, a gravel road and residential development. The south triangle is bordered by a navigable river, a railroad and a highway. Participants must choose the best area for residential and industrial development. The ¼" plywood overlays the base with the river cut out and painted blue.



STATION	A	B	C
1	25"	37"	3¾
2	25"	31"	4"
3	25"	25"	3¾"
4	37"	49"	3"
7	22"	43"	3"
8	25"	28"	5¼"
10	25"	52"	3"

NOTE: 1) DRAWER HANDLE TO BE PUT ON TOP
2) FOAM TRIM BETWEEN PLEXIGLASS & WOOD

LAND USE ACTIVITY 2 - PLAN A PARK

MATERIALS

7 sq.ft. 1/2" AD plywood
7 sq.ft. plexiglass
10 lineal ft. 1 x 5" pine
12 screws/finishing washers
12 model houses
25 model trees
7 sq.ft. grass paper
Assorted letters & numbers

Approximate Cost $25.00

DIRECTIONS SIGN

PLAN A PARK
In this activity you are asked to help plan a park. Locate within this park a nature center, picnic area, swimming area, playground, and a parking lot. Select what you feel would be the best position for each of these areas and record it by using a letter and number from the grid.

DESCRIPTION

The objective of this model is to have participants indicate where they would place certain park features if they were planning a park. The model shows various features already present. They include forested areas, nearby homes, open grassy areas and a river. The plexiglass top has a grid system with letters and numbers so that features can be located in that way. The grid system is made from self-adhesive lines available at art and/or engineering equipment stores.

Refer to construction plan on P. 1. The dimensions for the case are:

A = 25" B = 31" C = 4"

LAND USE ACTIVITY 3 - SHRINKING SHORELINES

MATERIALS

5 sq.ft. 1/2" AD plywood
5 sq.ft. plexiglass
9 lineal ft. 1 x 4" pine
8 screws/finishing washers
16 model houses
1 qt. clear cast for lake
4 sq.ft. grass paper

Approximate Cost $29.00

DIRECTIONS SIGN

SHRINKING SHORELINES
In this activity two types of shoreline developments are shown. The development of the west side is common to Minnesota. List on your Data Sheet some environmental effects from each type of development.

DESCRIPTION

This model is designed to show two ways that a lake shore could be developed. The lake is formed by using blue clear-cast in a ¼" plywood cutout. Each side of the lake shows a different kind of development. One side shows a cluster development and the other, more typical, linear development.

Refer to the construction diagram on P. 1. The dimensions for this case are:

A = 25" B = 25" C = 3½"

LAND USE ACTIVITY 4 - THE TRANSIT TRIANGLE

MATERIALS

13 sq.ft. 1/2" AD plywood
13 sq.ft. 3/16" plexiglass
15 lineal ft. of 1 x 4" pine
12 screws/finishing washers
6 sq.ft. 1/4" plywood
24 model cars
8 model bus, train & monorail
3 skyscraper silhouettes
Assorted letters and numbers

Approximate Cost $54.00

DIRECTIONS SIGN

THE TRANSIT TRIANGLE
This activity shows three highways entering a downtown area. As the population grows from 1970-2000, the demand on the land for roads also increases. An alternative is a mass transportation system. This system uses buses, trains, vans and monorails. Carefully look at the display and note the changes from 1970-2000.

DESCRIPTION

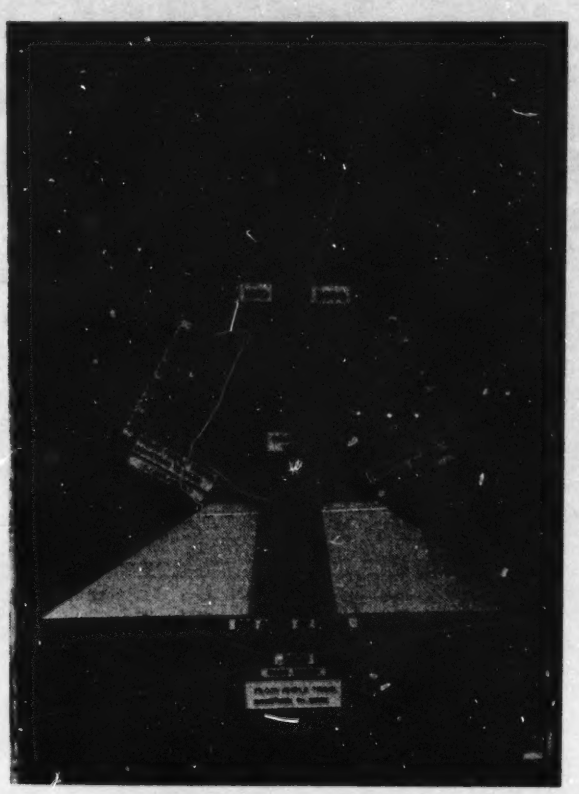
The effect of mass transit is illustrated by this model. It is to show movement of vehicles to a metropolitan area. The numbers of people moved is represented by number of cars and the size of the highway. The future is shown in two instances, one with mass transit and the other without. The results again are indicated by the number of automobiles and the size of the highway. The point of the activity is to show that land can be saved from use by highways, parking, etc., if mass transit is used.

Refer to construction plan on P. 1. Dimensions for the case are:

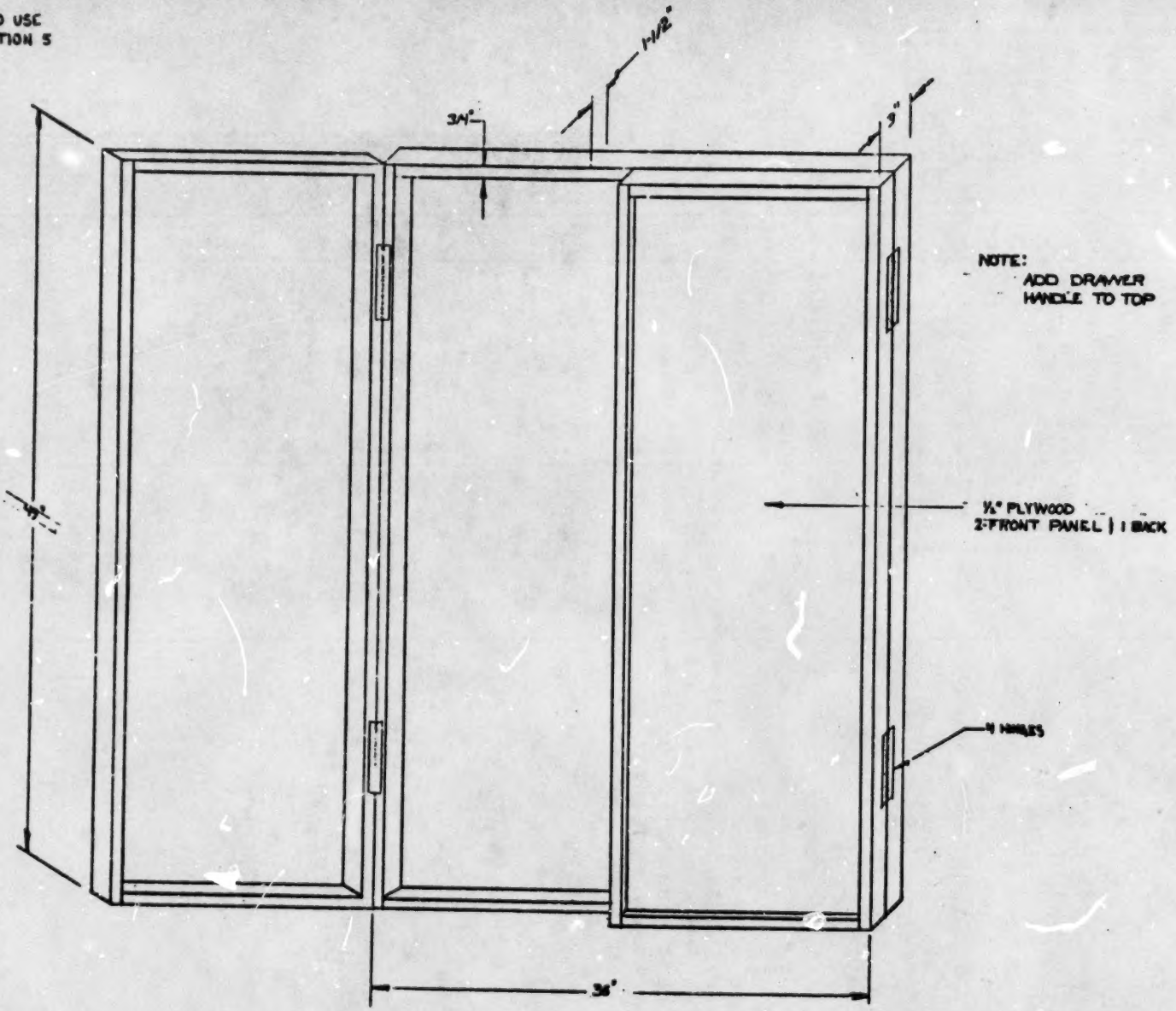
A = 25"

B = 31"

C = 4"



LAND USE
STATION 5



ACTIVITY 5 - SOIL SAVER (CONT'D)

MATERIALS

24 sq.ft. 1/2" AD plywood
36 lineal ft. 1 x 2" pine
4 pr. hinges
2 clasps
10 sq.ft. tagboard
10 8 x 10 photographs
Assorted letters
10 sq.ft. 1/8" plexiglass
40 screws/finishing washers

Approximate Cost $65.00

DIRECTIONS SIGN

SOIL SAVER

This activity shows three examples of soil erosion, a bare construction site, vertical plowing, and an eroded river bank. In each example the number of tons of soil which may be lost is shown. Under each example are soil saving methods. Study the display and follow directions on the Data Sheet.

DESCRIPTION

Several ways that soils can be saved are illustrated by this display. Participants are asked to record how much soil would be saved by various methods. The pictures show three common types of erosion:

- from a construction site,
- from an eroding river bank, and
- from plowing up and down hills.

The soil saving methods for each of these were:

1. Bare construction site - sodding, temporary groundcover.
2. Vertical plowing - contour plowing, terracing and strip-cropping.
3. Eroding river bank - riprapping, planting trees and grass.

The pictures may be available from your USDA Soil Conservation Service. The pictures used in the original display were made from the Rochester SCS office.

All pictures were mounted on mounting board and covered with plexiglass for protection.

LAND USE ACTIVITY 6 - WHERE SHOULD WE BUILD

MATERIALS

5 sq.ft. 1/2" AD plywood
4 sq.ft. 1/8" plexiglass
4 8 x 10 photographs
16 screws/finishing washers
1 sq.ft. 1/4" AD plywood
Assorted letters

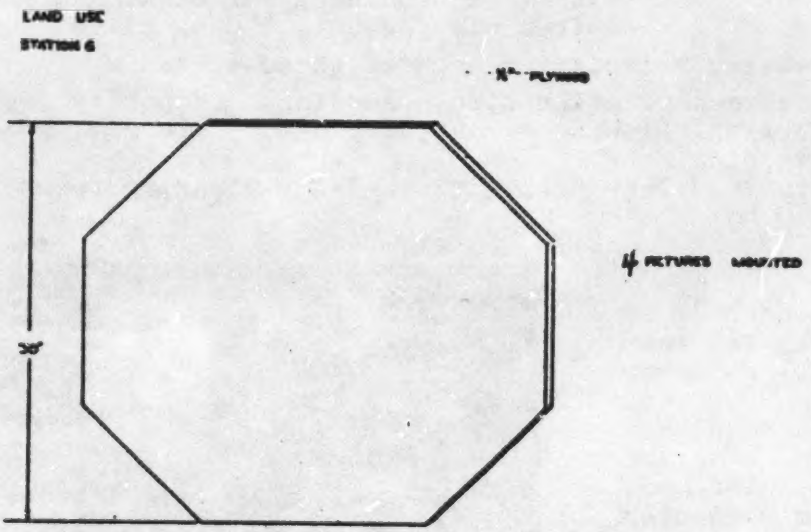
Approximate Cost $20.00

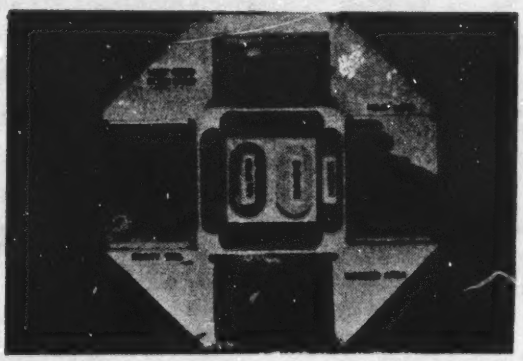
DIRECTIONS SIGN

WHERE SHOULD WE BUILD?
This activity displays four different land conditions. Into which land should the city grow? Rank the four land types from best to least favorable. Give reasons for your answers.

DESCRIPTION

This simple model provokes much thought and discussion. The four pictures show good farm land, rocky soil, woods and hilly land. Participants are to decide into which land should development go. Each picture is mounted on tagboard and covered with plexiglass for protection. The rounded rectangular pieces in the center represent the growing community. The pictures may be available at the nearest Soil Conservation Service office.





LAND USE ACTIVITY 7 - SOIL & SEPTIC TANKS

MATERIALS

8 sq.ft. 1/2" AD plywood
8 sq.ft. 3/16" plexiglass
12 lineal ft. 1 x 4" pine
1 pt. white glue
10 screws/finishing washers
Assorted tagboard
Rocks & soil
Epoxy glue

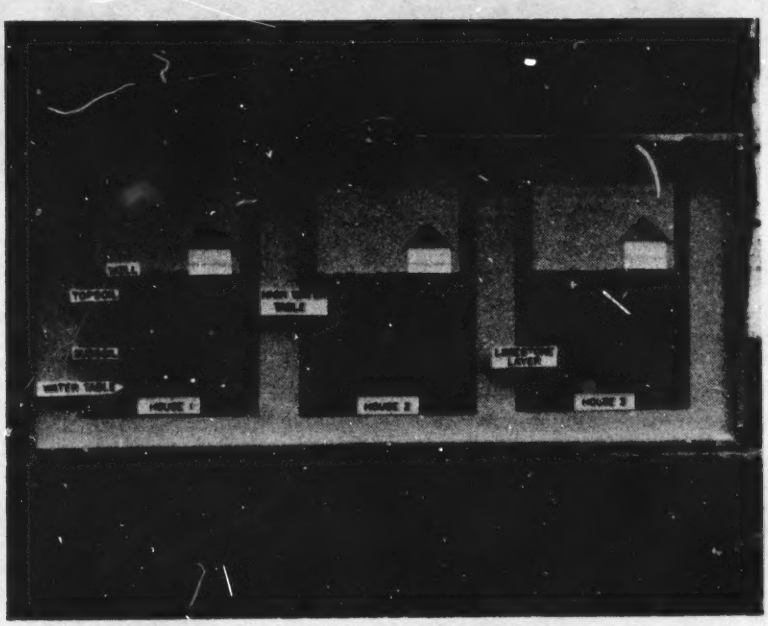
Approximate Cost $32.00

DIRECTIONS SIGN

SOIL & SEPTIC TANKS
This activity shows three soil conditions for septic tank use. A septic tank is a small sewage disposal system. Sewage leaving the septic tank is cleaned by the soil. Trace the path of the red sewage from the septic tanks in each example. Decide on which house you would prefer to live in.

DESCRIPTION

This model shows three different conditions into which sewage flows. The first house model shows the sewage being filtered by the soil so that it enters the water table clean. The second house shows a high water table where the sewage may be brought to the surface. The third house has sewage flowing into jointed and fractured limestone which does not filter the sewage. The sewage is represented by red paint and it becomes blue as it is filtered. The houses are tagboard glued to the background. The soil in the models is soil which has been consolidated with white glue diluted with water. The area representing the limestone is chips of limestone set into a pool of epoxy glue. The septic system from each house is shown as is the well for each house.



Refer to construction plan on P. 1. Dimensions for this case are:

A = 22" B = 49 1/2" C = 3"

LAND USE ACTIVITY 8 - SELECT A SLOPE

MATERIALS

6 sq.ft. 1/2" AD plywood
6 sq.ft. 1/8" plexiglass
9 lineal ft. 1 x 6" pine
8 screws/finishing washers
32 sq.ft. 1/2" styrofoam
Glue

Approximate Cost $25.00

DESCRIPTION

How slope should be used is illustrated with this activity. A model built up with ½" layers styrofoam (available from metal siding installers) shows 3 different slopes. Each layer of styrofoam is glued to the layer below it and is painted a different color. Be sure to use glue and paint which does not dissolve styrofoam. (Tempra paint works well.) The participants must assign uses to each slope.

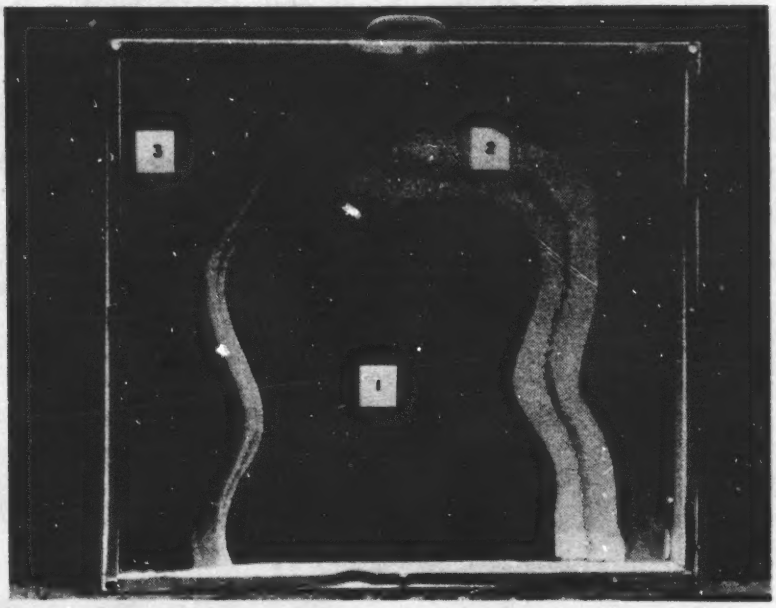
DIRECTIONS SIGN

SELECT A SLOPE

This model shows land with three different slopes, 1) level land, 2) gentle slope, and 3) steep slope. Below are listed several land uses:

woods factory orchard
houses cornfield freeway

Decide on which of the slopes these land uses might be a reasonable use. You may decide that some of the uses would be OK on more than one slope. Record the numbers on the Data Sheet.



Refer to construction plan on P. 1. Dimensions for this case are:

A = 25" B = 28" C = 5½"

LAND USE ACTIVITY 9 - RISING RIVER

MATERIALS

6.5 sq.ft. 1/2" AD plywood
15 sq.ft. 1/8" plexiglass
10 lineal ft. 1 x 8" pine
2 sq.ft. 1/4" AD plywood
6 ft. electric cord/plug
30 porcelain mini light sockets
30 GE #233 bulbs
Transformer
20 ft. insulated wire
75 screws for elec. apparatus
6 single pole push switches
Model houses

Approximate Cost $91.00

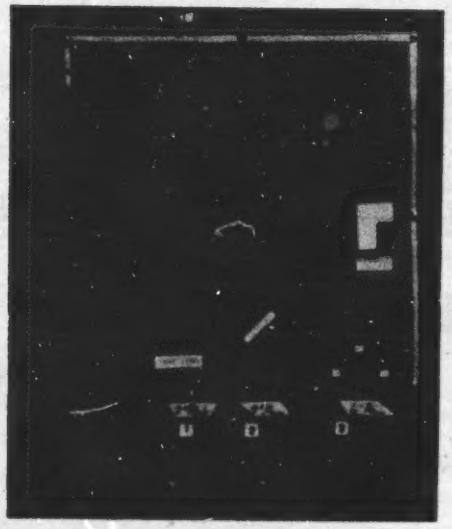
DIRECTIONS SIGN

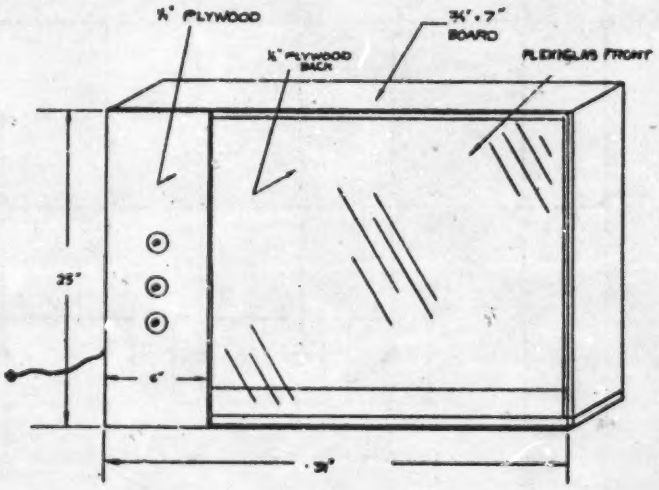
RISING RIVER

This activity shows a model of a town built along a river. To find what would happen to this town in a two-inch rainfall press button one, in a four-inch rainfall press button two, and in a six-inch rainfall press button three. Record your observations on the Data Sheet.

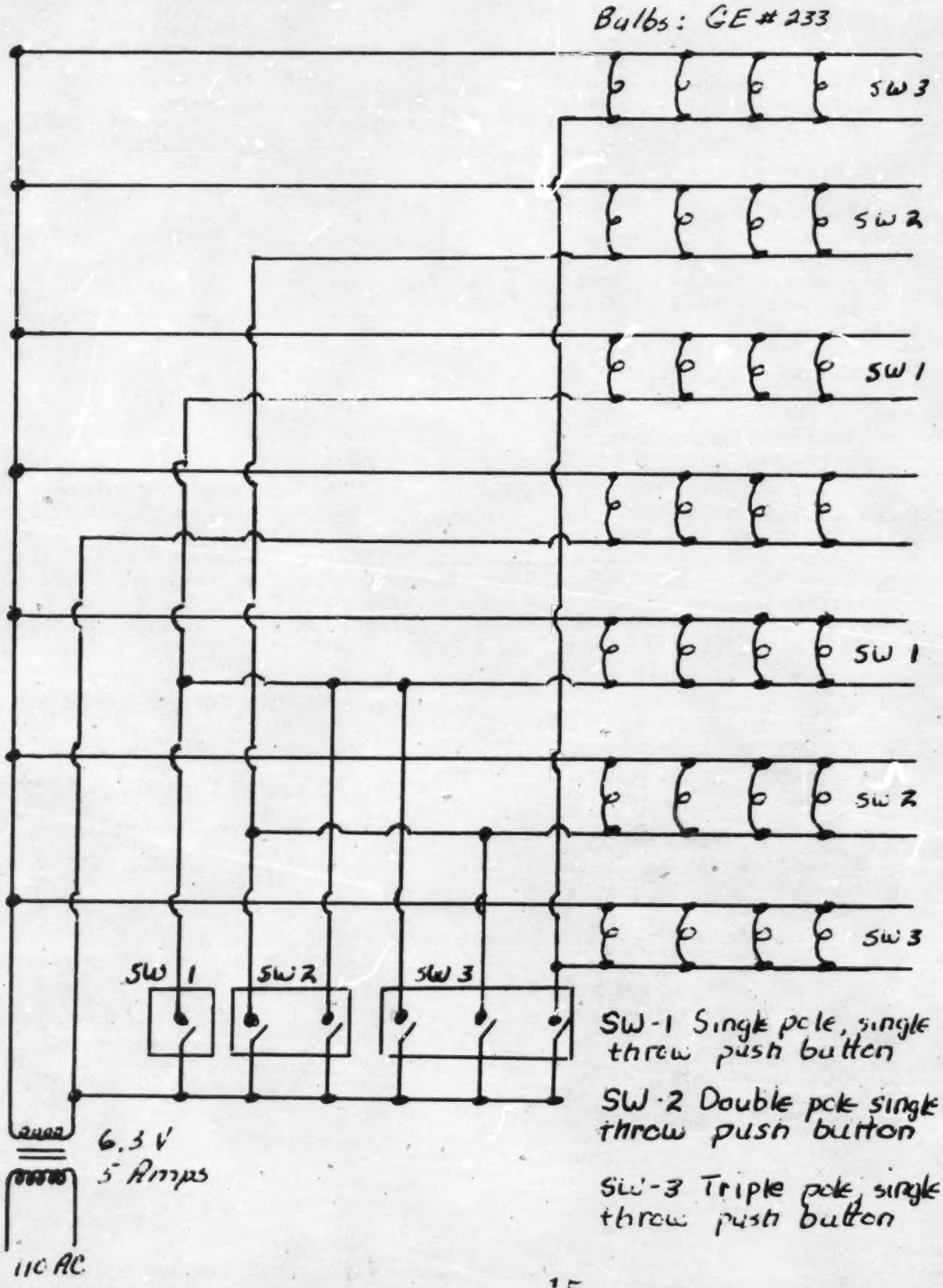
DESCRIPTION

By pushing the appropriate button this model will show the effect of a 2", 4" and 6" rainfall on part of a city built in the flood plain. The model is built in two levels. The lower level contains all wiring, transformer and the lights. The upper or visible level displays the model city. By pressing the appropriate button the area flooded lights up from below. The flood plain is made of plexiglass which has been painted lightly enough to make it translucent. The houses, factory and shopping center are made of blocks of ¼" plexiglass painted different colors. A wiring diagram is included.





ACTIVITY 9 - RISING RIVER (CONT'D)



LAND USE ACTIVITY 10 - MANAGING THE METROPOLIS

MATERIALS

10 sq.ft. 1/2" AD plywood
10 sq.ft. 3/16" plexiglass
6 sq.ft. 1/4" plexiglass
13 lineal ft. of 1 x 4" pine
12 screws/finishing washers

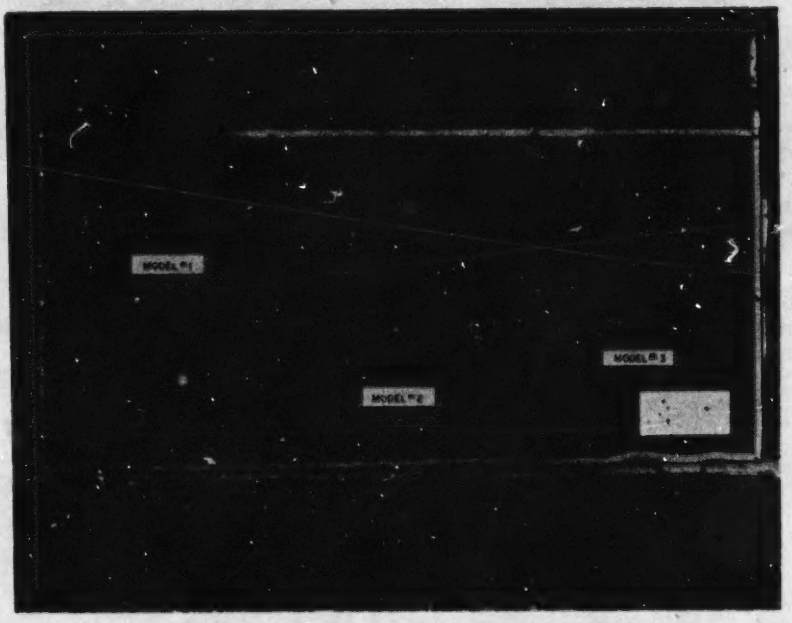
Approximate Cost $54.00

DIRECTIONS SIGN

MANAGING THE METROPOLIS
This activity shows how a city may expand. Model 1 shows a city in 1978. Model 2 shows the same city in the year 2000 without orderly growth. Model 3 shows the same city where growth has been controlled and orderly. Study the models and answer the questions on the Data Sheet.

DESCRIPTION

Designed to show the effect of uncontrolled urban growth, this model utilizes three urban replicas. They are cut from ¼" plexiglass and the colors are painted on the lower surface. The color blue represents commercial, green - parkland, red - residential area, black - industry and grey - transportation. The first model represents an urban area. The second model shows several developments disconnected from the original area and demonstrates the results of poor planning and uncontrolled growth. The third model represents the same urban area after several years of controlled growth. The metropolis models are held above the background by small blocks of wood glued with epoxy.



Refer to construction diagram on P. 1. The dimensions of this case are:

A = 25" B = 52" C = 3"

LAND USE ACTIVITY 11 - THE CHANGING CITY

MATERIALS

The changing picture set
26 sq.ft. 1/8" pressed wood
72 ft. screen trim
1 can spray adhesive
26 sq.ft. clear contact paper

Approximate Cost $32.00

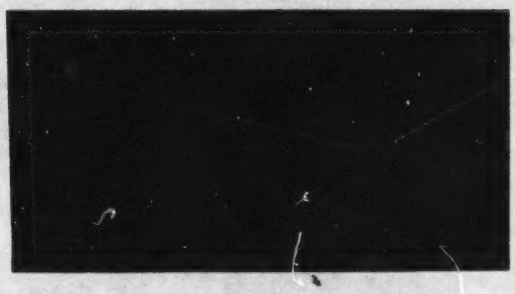
DIRECTIONS SIGN

THE CHANGING CITY
Carefully observe this series of pictures which show how a city might change. The city is shown at 3-year intervals from 1953 to 1976. Find three items which are in all the pictures.

DESCRIPTION

The Changing City is a set of pictures done by Jorg̈ Mueller, a Swiss artist, on how a European city might change over a period of years, from 1953 to 1976. This set of pictures is published by Atheneum Publishers and is available in most established bookstores. The cost is $9.95.

In order to withstand the wear and tear of use, the pictures were affixed to 1/8" masonite with a spray adhesive (available in photo shops) and covered with clear contact paper. The 8 pictures were then trimmed with a frame of 3/4" screen trim (available from the lumber yard). In order to further protect the pictures, a case was made as shown on the following page.



LAND USE ACTIVITY 12 - THE CHANGING COUNTRYSIDE

MATERIALS

See ACTIVITY 11

DIRECTIONS SIGN

THE CHANGING COUNTRYSIDE
Carefully observe this series of pictures which show how a country scene might change over a period of years. How has the land use changed? Find the white cat in each of the pictures.

DESCRIPTION

A second set of paintings from Jorg̈ Mueller is The Changing Countryside. It illustrates the change from a rural scene to super highways and discount supermarkets. The changes all occur from 1953 to 1972. This set of pictures, as The Changing City, are available from most bookstores. They are published by Atheneum Publishers and the cost is $9.95. For details in the treatment of this activity, see ACTIVITY 11.

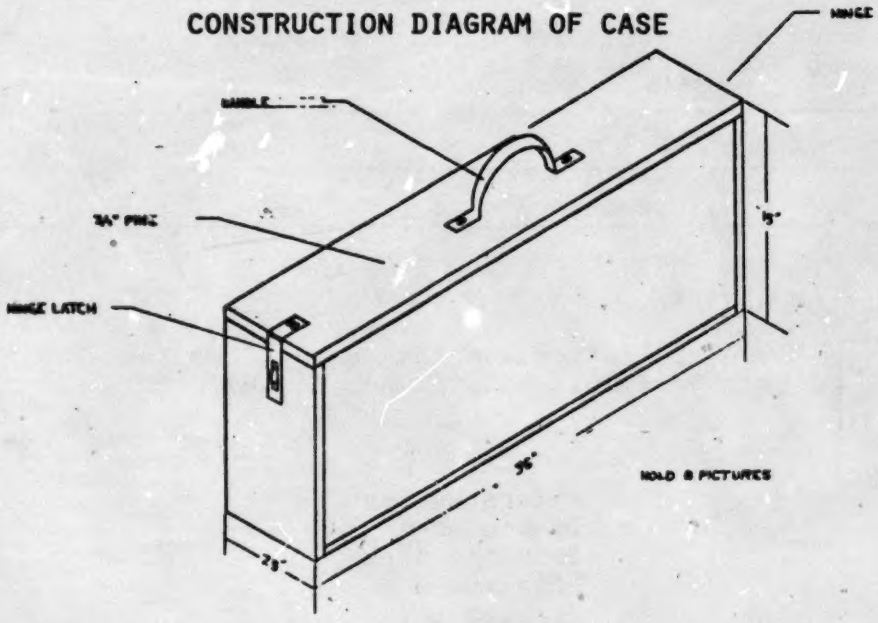
ACTIVITIES 11 & 12 - CHANGING CITY & COUNTRYSIDE (CONT'D)

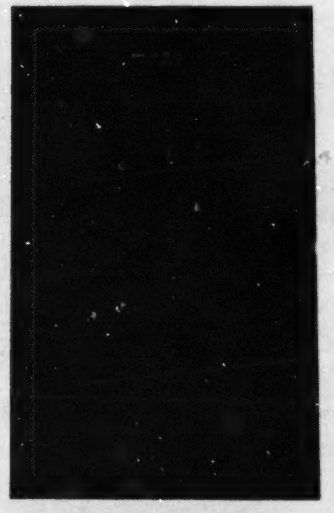
MATERIALS FOR CASE

9 lineal ft. of 1 x 8" pine
8 sq.ft. 1/8" pressed wood
10 lineal ft. of 3/8 x 3/8" pine for separators
1 pr. hinge
1 eye hook
1 handle

Approximate Cost $12.00 ea.

CONSTRUCTION DIAGRAM OF CASE

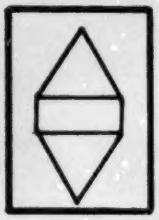




QUARRY HILL NATURE CENTER

STUDENT DATA SHEET — LAND USE SEMINAR — NAME_____

ACTIVITY 1 - WHERE O' WHERE



1. In which open space would you build new industry? _____
   Give reasons:
   A. _____
   _____
   B. _____
   C. _____

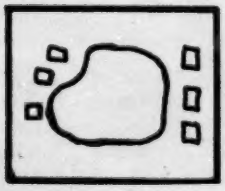
2. In which open space would you build new housing? _____
   Give reasons:
   A. _____
   B. _____
   C. _____

ACTIVITY 2 - PLAN A PARK

Place the letter and the number from the grid to show where you would locate each of the uses in the park:

	Letter Grid	Number Grid
Nature Center	_____	_____
Picnic Area	_____	_____
Swimming Area	_____	_____
Playground	_____	_____
Parking Lot	_____	_____

ACTIVITY 3 - SHRINKING SHORELINES



Observe the differences between the two developments and answer the following questions:

	West Side	East Side	
1. The number of cabins:	_____	_____	
2. The number of docks:	_____	_____	
3. The number of shoreline trees:	_____	_____	
4. Is there public access?	YES NO	YES NO	*(Circle)*
5. Is there shoreline erosion?	YES NO	YES NO	*(Circle)*
6. Which side looks better?	_____	_____	*(Check)*

7. On which side of the lake would you prefer to live? _____

_____

LAND USE SEMINAR — STUDENT DATA SHEET

ACTIVITY 4 - TRANSIT TRIANGLE

Fill in the blanks next to each of the years:

1970

1. How many acres of land for roads? _____
2. How many people travel downtown to work? _____
3. How many cars per family? _____

2000

4. How many acres of land for roads? _____
5. How many people travel downtown to work? _____
6. How many cars per family? _____

2000 WITH MASS TRANSIT

7. How many acres of land for roads? _____
8. How many people travel downtown to work? _____

On the basis of the above information, answer the following questions:

9. How many people are carried by mass transit? _____
10. How much land did not need to be taken up for roads and parking because of a mass transit system? _____
11. What do you think might happen to the number of cars per family with a mass transit system? _____

ACTIVITY 5 - SOIL SAVER

The three examples of soil erosion are: *a bare construction site, vertical plowing, and an eroded riverbank.* Answer the following questions about each example:

Bare Construction Site:

1. How much soil could be lost at this construction site? _____
2. How much soil could be saved by temporary ground cover? _____
3. How much soil could be saved by sodding? _____
4. What is the total amount of soil that could be saved? _____
5. How much soil is still lost with the soil saving methods? _____

Vertical Plowing

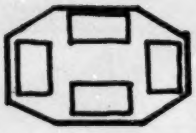
1. How much soil could be lost by vertical plowing? _____
2. How much soil could be saved by using the practice of terracing? _____
3. How much soil could be saved by using the practice of strip cropping? _____

4. How much soil could be saved by using the practice of contour plowing? _____

Eroded River Bank

1. How much soil could be lost on this river bank? _____
2. How much soil could be saved by planting trees and grass? _____
3. How much soil could be saved by riprapping? _____
4. What is the total amount of soil saved? _____
5. How much soil is still lost with these soil saving methods? _____

ACTIVITY 6 - WHERE SHOULD WE BUILD?



These are four land conditions into which the city could expand. Rank these four conditions for expansion 1 through 4; where No. 1 would be the best and No. 4 would be the worst.

Rocky soil _____
Very good farmland _____
Wooded area _____
Hilly land _____

Give reasons for your first and last choice: _____

_____

_____

ACTIVITY 7 - SOIL & SEPTIC TANKS

After tracing the path of red sewage from the septic tank in each example, circle the number to show which house you would prefer to live in? *Watch for the color change from red to blue.*

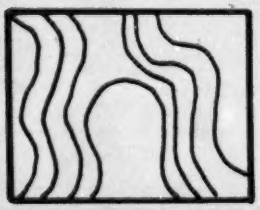
HOUSE 1 HOUSE 2 HOUSE 3

What is wrong with the two houses you didn't choose? _____

_____

_____

ACTIVITY 8 - SELECT A SLOPE



Listed below are some uses for the land. Decide which slopes could be used for the uses listed. Place the slope number or numbers in the blank space after each use.

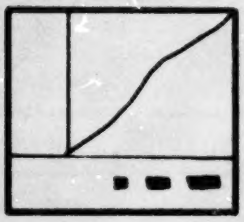
Woods _____ Factory _____ Orchard _____

Houses _____ Cornfield _____ Freeway _____

How many times did you put No. 1? _____; No. 2? _____; No. 3? _____.

Which slope of land is most desirable? _____

ACTIVITY 9 - RISING RIVER



The lighted area shows how far the river overflowed after each rainfall.

1. Count the number of houses flooded in the 2" rainfall _____; 4" rainfall _____; 6" rainfall _____.
2. What other buildings were flooded in the 6" rainfall?

_____

3. Why were there some houses not damaged by the flood? _____

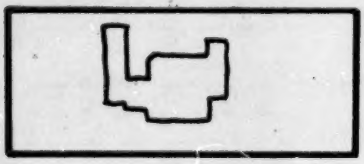
_____

4. If each house were damaged $2,500, how much damage would have been done in the 4" rainfall? _____; 6" rainfall? _____
5. Assuming $20,000 damage to the factory and shopping center, what is the total damage to these two buildings in a 6" rainfall? _____
6. TOTAL damage of houses and commercial buildings? _____ *(in a 6" rainfall)*
7. How much damage do you think happened to the parkland? _____
8. What could be better uses of land in a flood plain? _____

_____

_____

ACTIVITY 10 - MANAGING THE METROPOLIS



1. The colors represent:
   - Blue _____
   - Green _____
   - Red _____
   - Black _____
   - Grey _____
2. In which Model (2 or 3) has parkland decreased since 1978? _____
3. In which Model are there areas of growth not connected to the cities' boundaries? _____

4. In which Model has the growth been orderly? _____

5. Is planning for land use worth the time and money it takes? _____

Why? _____

_____

ACTIVITY 11 - THE CHANGING CITY

1953	1956	1959	1963	1966	1969	1972	1976

Find the blind man in each picture. What happens to him? _____

_____

Look for a building which is in all pictures. What happened to the building between 1966 and 1969? _____

_____

What happens to the park in the center of the picture? _____

_____

What one thing from the park remains? _____

ACTIVITY 12 - THE CHANGING COUNTRYSIDE

1953	1956	1959	1963	1966	1966	1972

How does the road in the picture change? _____

Find the cat in each picture. What happens to the cat? _____

_____

What effect does the highway have on the house? _____

_____

the tree? _____

and the pond? _____

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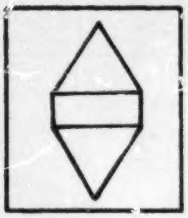
QUARRY HILL NATURE CENTER

TEACHER DATA SHEET LAND USE SEMINAR TEACHER _____

ACTIVITY 1 - WHERE O' WHERE



The purpose of this activity is to illustrate how transportation can be a determining factor in development of certain areas. Not only is transportation an influencing factor in this determination, but also the location of the houses in this particular display becomes an important consideration.

The students are asked to choose in which open space would they build housing and industry and give some reasons why. The open space to the north is best suited for housing and the open space to the south is best suited for industry. Here are some reasons:

1. Rivers can be used for transportation by industry.
2. Railroads and highways are a necessity for industrial transportation.
3. Generally speaking, industry should not be placed next to residential development.
4. It is easier to flood proof industry than homes.
5. Generally, homes should not be built near the noisy railroad.
6. Highways and homes are often not compatible.

Some of the other factors which might be taken into consideration in locating industrial developments are power availability, manpower supply, availability of raw materials and product distribution.

FOR DISCUSSION: What conflicts might arise if development were improperly carried out in this model. Who might stand to gain from poor land use and who might lose?

ACTIVITY 2 - PLAN A PARK

Students are asked to locate five use areas in a proposed park. A nature center, picnic area, playground, swimming area and a parking lot are the use areas to be located.

Because there are no absolute answers to the locations of these areas, we include some considerations which should be used in their positioning.

NATURE CENTER: Should have good view, natural setting, isolated from traffic and noise and be in an area open enough to discourage vandalism.

SWIMMING AREA: Should have sandy beach, maximum solar exposure, good lake or stream bottom (no dropoffs, etc.) and clean water.

PICNIC AREA: Should have a good view of water but should be separated by enough distance for safety. Should be proximal to playground and in insect-free area.

PARKING LOT: Should be located near entrance road. Accessable to both picnic and playground areas yet separated so as to avoid traffic hazards.

PLAYGROUND: Should be large enough to prevent hazards from playground equipment, far enough from parking areas and roads to prevent traffic hazards and should be well drained.

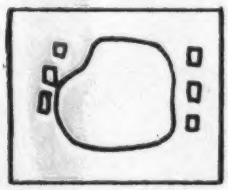
With these considerations in mind, the following answers are given as reasonable locations for the use areas mentioned:

		Letter Grid	Number Grid
1.	Nature Center	C	6
2.	Picnic Area	D	2
3.	Swimming Area	G	5
4.	Playground	D	3
5.	Parking Lot	C	2

This is strictly a judgment on the part of the student. There is no single correct answer but these are some answers which could be considered wrong. Placing the playground right next to the swimming beach would be a poor plan.

FOR DISCUSSION: Why is it important to consider the problem of vandalism? Do you think people would walk a long way from their cars to have a picnic?

ACTIVITY 3 - SHRINKING SHORELINES



People for many years have built their home away from home right on the water's edge. Cabins, boathouses, and docks ring the shoreline of many lakes without regard to the water environment. Yet the lake environment may be saved without prohibiting people from enjoying its natural beauty. One type of shoreline development that can provide this is called clustering.

The differences between cluster development and the more common linear development are shown in the model. Participants are asked to answer the following questions:

		West Side	East Side
1.	Number of cabins...	7	9
2.	Number of docks....	7	3
3.	Number of shoreline trees...	0	6-7
4.	Is there public access?	NO	YES
5.	Is there shoreline erosion?	YES	NO
6.	Which side looks better?	*Personal opinion.*	

7. On which side of the lake would you prefer to live? *Personal opinion.*

What are some environmental effects of clustering?

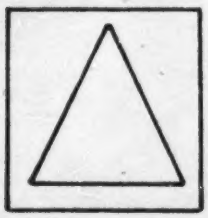
a. Retention of trees
b. Reduction of shoreline erosion
c. Cleaner water
d. Controlled number of docks
e. A more aesthetic shoreline
f. Septic systems can serve a cluster and, therefore, will cause less water pollution.
g. Public has lake access.

What are some of the environmental effects of linear developments?

a. Removal of trees
b. Soil erosion
c. Dirty water
d. Dock clutter
e. Cabins and septic systems too close
f. Visual pollution
g. No public access

FOR DISCUSSION: In which type of development would you care to live? This will certainly be a personal preference. Some will prefer to have a cabin directly on a treeless shore with their own private dock. This is what many people are used to doing. It is not, however, the best way to treat a shoreline.

ACTIVITY 4 - TRANSIT TRIANGLE



YEAR: 1970

1. 500 acres 2. 50,000 people 3. 1.5 cars/family

YEAR: 2000

4. 800 acres 5. 75,000 people 6. 2.0 cars/family

YEAR: 2000 with Mass Transit

7. 500 acres 8. 75,000 people

On the basis of the above information, answer the following questions:

9. 25,000 people 10. 300 acres saved 11. Decrease

One of the points illustrated in this activity is that a mass transportation or transit system can save on the amount of land that is needed for roads. The demand on the land for roads increases as the population and the number of cars increase. Meeting this demand means taking up areas of open space and already developed areas for road building. If a mass transit system can provide a viable means of transporting large masses of people, the number of cars and the demand for more roads should decrease.

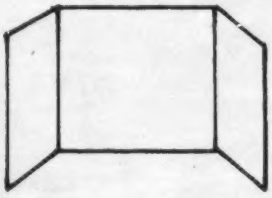
FOR DISCUSSION; What are some other effects a decreased number of cars could have? Some obvious effects would be less fuel used, less pollution, fewer traffic jams, fewer parking ramps and lots fewer traffic accidents and deaths.

A mass transit system is not an instant panacea for transportation problems. It requires a large mass of a million or more people, extensive planning, and its success depends upon relative times, costs and comfort. Many large cities are too diffused with no actual downtown area for transportation corridors. The shape of the city is also a key to its success.

We can still continue to manufacture more efficient cars and bigger and better highways. Yet the one thing we are unable to manufacture is space. To make good use of the space available is one of the advantages of a mass transit system.

The movement of people in a metropolitan area is an essential factor in land use planning. It becomes increasingly difficult to transport people by automobile. An alternative is a mass transit system. The possible benefits of a mass transit system are illustrated in this activity.

ACTIVITY 5 - SOIL SAVER



Soil erosion affects everyone. The purpose of this activity is to show three common types of erosion and soil saving practices which will reduce that type of erosion. The answers require simple addition and subtraction:

Bare Construction Site

1) 25 tons/year 2) 5 tons 3) 15 tons
4) 20 tons 5) 5 tons

Vertical Plowing

1) 23 tons/acre/yr. 2) 18 tons/acre/yr. 3) 17 tons/acre/yr.
4) 11 tons/acre/yr.

Eroded River Bank

1) 20 tons/year 2) 7 tons/year 3) 10 tons/yr.
4) 17 tons 5) 3 tons

FOR DISCUSSION: How does soil erosion affect everyone? The result of erosion is sediment. Sediment fills in irrigation and roadside ditches, ponds, streams, lakes, water reservoirs, and rivers. Rivers flood more frequently because channels are filled with sediment.

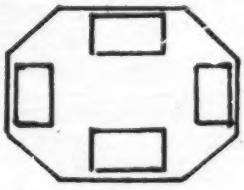
Sediment dredged each year from streams, navigation channels, estuaries, and harbors is estimated close to one billion cubic yards. The cost of dredging and sediment damage amounts to many millions of dollars.

Construction sites are very susceptible to erosion, any distrubance of ground cover can cause soil loss. Large sites that may keep an area bare for a long period of time are especially detrimental. To prevent erosion at these sites vegetation of any kind should be left until construction begins and only the area required for operations should be removed. Temporary cover should be used immediately, then resod the site as soon as is practical.

Farmland is another contributor of sediment. As seen in the picture, erosion results from growing row crops (corn, soybeans) on steep land, from straight row farming on slopes that should be contoured or terraced, and from too frequent cultivation of land that needs alternating row crops and grass crops (wheat, alfalfa). (Called strip cropping.)

The third example of erosion is on river banks. When people first came to this country, they settled along the rivers and cleared the land which allowed erosion. This practice hasn't changed much since the settlers. Development along rivers still means the clearing of trees and vegetation. With no trees to offer resistance rivers and streams begin to erode their banks. Rivers and stream banks can be protected by rock rip-rapping and planting of trees and vegetation.

ACTIVITY 6 - WHERE SHOULD WE BUILD?



Everyone uses the land to some extent. Some uses of areas are more suitable for some uses than for others. This choosing of the right use in the right place is the purpose of this activity. The wise uses of land depend upon many factors such as slope, soil type, vegetation, and surrounding uses. Many such factors are not shown in this display because of the complexity involved in understanding. Thus the choice must be made using only the general appearance from the picture. These are the answers and reasons we came up with:

To rank the four land examples for urban expansion might be accomplished as follows:

Most favorable

1. Rocky soil would be the best land for urban expansion. A reason for this choice is that the land has no other attributes.

2. Second choice would be the hilly land. From the picture it appears that the land is too steep for most agriculture and yet could be used for development if certain erosion prevention precautions were taken.

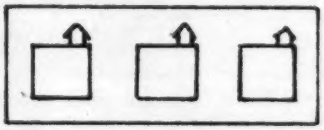
3. The wooded area would be a good third choice. It is presently raising two crops - wood and wildlife. These would be removed by a housing development. It would certainly be a better choice than the farmland.

Least favorable

4. To use up very good farmland for urban expansion is unwise land use and should be minimized whenever possible. The food products produced in this area could not be produced in any of the other three areas pictured.

FOR DISCUSSION: You may get some differences of opinion on the answers given above. Some people will feel that the woods will be the most desirable place to build a home. It sort of depends on whether it is your home you are talking about. People who are living on a farm may think that that certainly is the best place to have a home. Some people will be convinced that rocky soil is a bad place to build a house and there will be some who will like the hillsides. The discussion here should center on the advantages and disadvantages of each.

ACTIVITY 7 - SOIL & SEPTIC TANKS



The students are asked to trace the path of sewage (colored red) from the septic tanks. In comparing the three conditions the student should be able to see the effects of each. Hence they should have circled House No. 1 and given reason why they didn't choose the other two. The following is an explanation of each condition:

HOUSE 1: The sewage travels from the septic tank and is red in color. As it is filtered, it changes to brown and finally to blue when the water has been cleaned. The clean water enters an acquifer where it remains until it is pumped out by the well This is the normal condition.

HOUSE 2: The red sewage leaves the septic tank but is unable to travel down to be cleaned because of a high water table. The sewage may be forced to rise to the surface and may become a health problem.

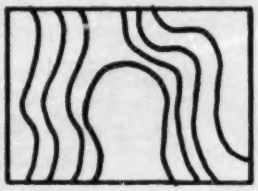
HOUSE 3: The sewage (red) travels down through the topsoil but is not filtered by the limestone. The joints and fractures in the limestone allow the sewage to travel through without being filtered. The red sewage passes through to the acquifer where it pollutes the water.

FOR DISCUSSION: Students should be made aware that there are many areas where the water table is quite high as in Model No. 2. Lakeshore, pond, stream and marsh areas and sometimes just low lying lands may all have water tables close to the surface. The operation of a septic tank is questionable in this situation. The optimum kind of situation for a septic system and drain field is soil and/or porous rock like sandstone. We've tried to show this in Model No. 1.

Model No. 3 shows a condition which is fairly common in southeastern Minnesota or wherever limestone is the bedrock. The natural fracturing of the limestone allows water to run through it without much filtering action. It is this kind of action which eventually produces sinkholes and caves. It is <u>not</u> a good condition for septic drainage.

In order to make sure of underground conditions <u>before</u> putting in a septic system. Soil borings should be made or the Soil Conservation Service consulted.

ACTIVITY 8 - SELECT A SLOPE



Slope of land refers to its steepness. The steepness of a slope affects how the land should be used. Slope is expressed in percent:

0- 2%	nearly level
2- 6%	gently sloping
6-12%	moderately sloping
12-18%	moderately steep
18-25%	steep
25-greater	very steep

The three slopes in the model were 1. 0-2%; 2. 6-12%; 3. 18-25%.

Development of hillside areas requires careful planning. Generally, the steeper the slope the less density of development should occur. As the steepness of a slope increases, the potential for environmental damage by development also increases. Based on this information, we could come up with these answers:

Woods	1, 2, 3	Factory	1	Orchard	1, 2
Houses	1, 2	Cornfield	1, 2	Freeway	1, 2

NUMBER 1 was used 6 times
NUMBER 2 was used 5 times
NUMBER 3 was used 1 time

FOR DISCUSSION: It is evident from the above answers that steep slopes should remain undisturbed and the more gradual slopes are more desirable for use.

It also points out the fact that there is bound to be conflict over the use of land. In many cases the land use which is applied goes to the highest bidder which may not necessarily represent the best use.

Of course, many other considerations must be taken into account such as soil type, geology, climate, surrounding uses, economics, etc., as well as slope.

Land use planning uses these factors to assign a preferred use to the land and this prevents wrong uses because of the high bidder practice.

ACTIVITY 9 - RISING RIVER

This activity illustrates a portion of a town built in a flood plain. The flooding activities of a river are generally based on the amount of precipitation occurring in the watershed. The model shows what happens in the town when a 2-inch, 4-inch and 6-inch rainfall occur in the watershed. The answers to the questions on the data sheet are below:

1. 2" rainfall - 1 4" rainfall - 8 6" rainfall 1

2. Factory, shopping center

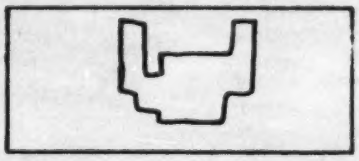
3. These houses were located out of the floodplain.
4. 4" rainfall - $20,000 6" rainfall - $37,500
5. $40,000
6. $77,500
7. Very little damage done to the parkland.
8. Parkland

The purpose of this activity is to illustrate that we have generally done a poor job of using land in the flood plain. It should show that flood damages will occur when we build shopping centers, hospitals, factories and homes in flood prone land. The use of this land for other purposes such as parkland, open space, wildlife areas or other non-construction uses, would prevent expensive damages from flooding.

Man seems to be unable to accept the fact that rivers have been flooding since they began running which was long before man arrived on the scene. We build our cities in the flood plain and then are upset when the river continues its natural process of flooding.

Levees, channelization, dams and flood-proofing buildings are stop gap measures at best. The only real solution is to remove development from the flood plain.

ACTIVITY 10 - MANAGING THE METROPOLIS



Land use conflicts are inevitable with today's patterns of society and economy. Much of the concern is in metropolitan areas. Problems such as subdivisions overrunning good farmland; gravel and sand quarry operations, highway construction and waste discharges from industries point out the need for land use planning.

Many of the solutions to such land use conflicts will come through planning and managing. Making people aware of the problem is an important step. That is the purpose of this activity.

This activity shows both the controlled and uncontrolled development of a metropolitan area. The answers to the question on the student data sheet are as follows:

1. Blue - business
   Green- parkland
   Red - residential housing
   Black- industry
   Grey - highway
2. Model 2
3. Model 2
4. Model 3
5. Yes

LAND USE SEMINAR — TEACHER DATA SHEET

FOR DISCUSSION: Many problems of uncontrolled growth are not obvious in the model. The supplying of services to these outlying areas is one problem area. Give some examples of these services. What might be other problems associated with uncontrolled growth?

ACTIVITY 11 - THE CHANGING CITY

1953	1956	1959	1963	1966	1969	1972	1976

Find the blind man in each picture. What happens to him? The blind man is being loaded into the ambulance.

Look for a building which is in all pictures. What happened to the building between 1966 and 1969? It is moved to the left and turned. (Grill Corner)

What happens to the park in the center of the picture? It gradually disappears.

What one thing from the park remains? The statue.

FOR DISCUSSION: Although the students are being asked to pick out details of this group of pictures the "big picture" should not be lost. The haphazard changes in use show a terrible waste of resources and demonstrate a complete lack of planning. Talk about the general character of the area through the 23 years described in the pictures.

ACTIVITY 12 - THE CHANGING COUNTRYSIDE

1953	1956	1959	1963	1966	1966	1972

This series of pictures produces, without words, a haunting statement about progress. Students are asked: How does the road in the picture change? *The road changes from a narrow gravel road to a 4-lane expressway.* What happens to the cat? *The cat is run over on the expressway.* What effect does the highway have on the:

Removes it.	Removes it.	Removes it.
House	Tree	Pond

FOR DISCUSSION: Students may be emotionally affected by this series. If they are cat fanciers, it may be a shock to them to see the cat squished on the road. They should be encouraged to express their feelings about this. They could be asked to convey their feelings if it were <u>their</u> house. As in the series in ACTIVITY 11, don't allow the students to lose the big picture for the details.

QUARRY HILL NATURE CENTER

IQ Quiz Answers — LAND USE SEMINAR — Teacher _____

T 1. Because transportation is essential to industry for moving its raw materials and manufactured goods, industrial development should occur near these transportation modes. Conversely, industrial use of land generally is not compatible with residential or park uses.

T 2. Because parks are generally for the preservation of some open space for recreational purposes, it is reasonable that woods and water are two resources which must be considered. Roads must also be considered and planned to provide access but not disturb the integrity of the open spaces and/or recreational areas.

F 3. Riprapping is covering the soil with rock and is used to prevent soil loss on a river bank.

F 4. Cabins can be built along shorelines with very little disruption of the natural vegetation. It all depends upon the priority placed on that item. Cluster development makes saving shoreline trees much easier as there is a greater setback of the cabins.

T 5. Our growing population and expanding cities foster land use conflicts. Planning to minimize these conflicts is an important step in bringing about solutions.

T 6. It is obvious that 40 cars will use more gas than one bus.

T 7. When you consider that a residential street requires about 4 acres per mile and a freeway uses 17 acres per mile, you can see the importance of transportation in land use planning.

T 8. By clustering cabins some distance back from the lake, there will be no need to remove any shoreline trees. This would maintain the aesthetic value of the lake shore.

F 9. A high water table will prevent the sewage from seeping down into the soil for cleaning.

T 10. Owning a lake cabin has been a popular recreational pursuit in Minnesota for many years. Because there are more than 15,000 lakes in Minnesota, it probably looked as though the shorelines would never run out and people felt free to build very near the water and remove any or all trees. Besides allowing shoreline erosion, this aesthetically ruins the lake shore. Cluster development prevents this from happening.

T 11. If a land use plan was developed long ago that considered all the factors, many of our conflicts would not exist today.

F 12. Planting row crops on steep slopes is not a wise land use! Erosion becomes a problem and machinery cannot maneuver on steep slopes.

T 13. A high water table will prevent the sewage from seeping down into the soil for cleaning and will contaminate much of the water in the area.

LAND USE SEMINAR QUIZ ANSWERS

T 14. The slope like many other factors is just one element in determining how land should be used. Slope most often involves problems with erosion.

T 15. Lake shore erosion is caused by wave and ice action. Removing trees from the shoreline will enable the waves and ice to remove the soil faster because the roots will no longer be holding the soil. Stream bank erosion occurs mainly from the current of the water especially during floods. Tree removal will again remove the binding effect of the roots.

F 16. Almost any type of construction on a flood plain is poor land use. Unfortunately, many of the cities in Minnesota and the country are built in the flood plains. The Corps of Engineers owes its existence to our poor land use.

T 17. Limestone characteristically is laced with fissures and joints. Sewage may run through these cracks and not be cleansed in any way. If this occurs, the water in the water table is contaminated and made unusable for many purposes. To allow septic systems to drain into this type of bedrock is a questionable land use.

T 18. When uncontrolled growth is allowed around a metropolitan area, the cost of providing services such as fire and police protection, water and sewage disposal is very expensive. Very often the island growth takes place on the cheapest land, not necessarily the best for development. Land use planning would provide for orderly expansion using the land most advantageously.

T 19. Any structure flooded is going to suffer some loss. If the structure is a home, store or factory, the loss may be substantial. If the land is used for crops, parkland or wildlife area, the damage will be slight. It costs more to replace a dining room table than a picnic table, especially if the dining room must be replaced also.

T 20. The subject is very controversial. Many landowners feel that they should be able to do whatever they want with their land. Land use planning provides some control over the use of land. It provides for orderly development of cities, provides for protection of good farmland, protects the flood plain and takes into consideration special problems which should have an effect on how the land is used.

T 21. Whenever construction of some kind occurs on land, it becomes difficult to change the use. It would necessitate the removal of the constructed items which at best is expensive and often wasteful. We should be right when we decide on the use to be made of a piece of land.

T 22. A good land use policy many years ago would have maintained the flood plain as just that. Wildlife area, park, forest preserve are all uses of flood plain which will not be harmed and can even benefit from flooding. Millions of dollars are spent every year for flood control.

LAND USE SEMINAR QUIZ ANSWERS

T 23. Many Minnesota lakes are well on their way to eutrophication. The land of sky blue waters may become the land of pea soup green waters. On many lake shores, the sewage either runs directly into the lake or it may run through a 55-gallon drum which is the typical cabin septic system. Some reasonable planning would not have allowed this problem to develop. This is also why we must use our remaining lake shores properly.

T 24. There are many factors to be considered in land use planning. Some of them are:

*Soils	*Prevailing winds
*Bedrock	*Climate
*Slope	*Economics
*Ground water	*Historical use

F 25. Terracing is a method of preventing rapid runoff of water from farm fields. The terrace is a mound of earth pushed up following the contour of the field.

QUARRY HILL NATURE CENTER

LAND USE IQ QUIZ — LAND USE SEMINAR — NAME _____

This quiz on land use should be completed after you have finished the learning stations. Land use planning is an important process. It becomes more important as our populations grow and urban areas expand. This quiz will let you know how well informed you are in some important aspects of land use.

23-25 correct - You have a good understanding of land use principles.

20-22 correct - You have a fair understanding of land use principles.

0-19 correct - It would be good for you to spend some time studying the principles of good land use.

Place a T in the blank if the statement is true; place an F in the blank if the statement is false.

___ 1. It would be a better land use to locate industries near highways, railroads and rivers rather than near homes, trees and parks.

___ 2. Woods, water and roads are some of the important things to consider when planning a park.

___ 3. Riprapping is a conservation practice to prevent soil loss in a cornfield.

___ 4. Clearing of all trees is necessary when building cabins along a lakeshore.

___ 5. As our population grows and cities expand, land use planning becomes more and more important.

___ 6. More fuel will be saved by a bus carrying 40 passengers than if each passenger were driving separately.

___ 7. Transportation is an important factor in land use planning.

___ 8. Presence of trees along the lakeshore is usually a characteristic of cluster cabin development.

___ 9. Land which has a high water table is excellent for septic tank operation.

___ 10. The type of shoreline development most common in Minnesota is linear development.

___ 11. If land use planning began long ago, we would probably not have the problems of uncontrolled growth.

___ 12. A steep slope would best be used for planting corn.

LAND USE SEMINAR IQ Quiz

___ 13. When groundwater is near the surface, sewage from a septic tank cannot be absorbed and cleaned by the soil.

___ 14. The slope of the land should be considered when determining how the land is to be used.

___ 15. Erosion of a lake or river shoreline may be caused by removal of trees.

___ 16. Building a town on a flood plain is good land use.

___ 17. The presence of cracks in limestone rock layers can allow sewage to pass through it without being filtered and cleaned.

___ 18. Scattered areas of housing and industry outside city limits are examples of uncontrolled or unwise growth.

___ 19. The amount of damage caused by a flood depends upon how the flooded land is being used.

___ 20. Many people are opposed to land use planning.

___ 21. In many cases once land is used for a particular purpose, it is very difficult to change that use.

___ 22. If land use planning began long ago, we would probably not require flood control planning today.

___ 23. Many of Minnesota's lakes are being polluted by poor sewage disposal from lakeshore cabins.

___ 24. Many factors such as soil, slope, underlying rock, and prevaling wind direction, need to be considered in good land use planning.

___ 25. Terracing is a conservation practice to prevent erosion from a river bank.

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